

CLAIMS

1. An optical add/drop multiplexing system, comprising:
 - a first optical system, said first optical system including a first series of optical components comprising a first grating, a second grating and a third grating, a first beam/port and a second beam/port, all of said first series of optical components optically aligned with one another;
 - a second optical system, said second optical system including a second series of optical components comprising a fourth grating, a fifth grating and a sixth grating, a third beam/port and a fourth beam/port, all of said second series of optical components optically aligned with one another;
 - a pixellated, switchable grating, said pixellated, switchable grating having a plurality of pixels, each of said pixels having a controllable state, said pixellated grating being interposed optically between said first optical system and said second optical system; and
 - means operably connected to said pixellated grating for controlling the state of each of said pixels;
 - wherein a plurality of wavelength division multiplexed signals which pass through said first optical system and said second optical system can be individually exchangeable between said first optical system and said second optical system based upon the state of said pixels as said signals pass through said pixellated grating.
2. The optical add/drop multiplexing system as defined in claim 1, wherein said first grating, said second grating, said third grating, said fourth grating, said fifth grating and said sixth grating are each a non-switchable grating.
3. The optical add/drop multiplexing system as defined in claim 1, wherein at least one of said first grating, said second grating, said third grating, said fourth grating, said fifth grating and said sixth grating is a non-switchable grating.

4. The optical add/drop multiplexing system as defined in claim 1, wherein at least one of said gratings is a volume holographic grating.

5. The optical add/drop multiplexing system as defined in claim 4, wherein said at least one of said volume holographic gratings is a Polymer Dispersed Liquid Crystal (PDLC) grating.

6. The optical add/drop multiplexing system as defined in claim 1, wherein said first grating, said third grating, said fourth grating and said sixth grating each have a preselected spatial frequency and said second grating, said fourth grating and said pixellated, switchable grating each have twice said preselected spatial frequency.

7. The optical add/drop multiplexing system as defined in claim 1, wherein said first grating and said third grating are optically positioned substantially symmetrically with respect to said second grating, and said fourth grating and said sixth grating are optically positioned substantially symmetrically with respect to said fifth grating.

8. An optical add/drop multiplexing system, comprising:

- a first pair of gratings optically aligned with one another, and a second pair of gratings optically aligned with one another, said first and second pair of gratings being optically aligned with each other and forming a first optical system;

- a third pair of gratings optically aligned with one another, said third pair of gratings forming a second optical system, said third pair of gratings including a switchable grating capable of being switched between states;

- said switchable grating of said third pair of gratings being optically interposed between one of each of said first pair and said second pair of gratings of said first optical system; and

means operably connected to said switchable grating of said third pair of ratings for controlling the state of said switchable grating;

wherein wavelength division multiplexed input signals can be exchangeable between said first optical system and said second optical system based upon the state of said switchable grating.

9. The optical add/drop multiplexing system as defined in claim 8, wherein said first optical system includes a first beam/port and a second beam/port, and said second optical system also includes at third beam/port.

10. The optical add/drop multiplexing system as defined in claim 9 further comprising:

at least a fourth optical system, said at least a fourth optical system comprising a fourth pair of gratings, optically aligned with one another, said fourth pair of gratings including a switchable grating capable of being switched between states; and

means operably connected to said switchable grating of said fourth pair of gratings for controlling the state of said switchable grating of said fourth pair of gratings;

11. An optical add/drop multiplexing system, comprising:

a first optical system, said first optical system including a first series of optical components comprising a first grating, a second grating and a third grating, a first beam/port and a second beam/port, all of said first series of optical components optically aligned with one another, and said second grating being a pixellated, switchable grating capable of being switched between states;

a second optical system, said second optical system including a second series of optical components comprising a fourth grating, a fifth grating and a sixth grating, a third beam/port and a fourth beam/port, all of said second series of optical components optically aligned with one another, and

said fifth grating being a pixellated, switchable grating capable of being switched between states;

a non-switchable grating, said non-switchable grating being interposed optically between said first optical system and said second optical system; and

means operably connected to said pixellated gratings for controlling the state of each of said pixels;

wherein a plurality of wavelength division multiplexed signals which pass through said first optical system and said second optical system can be individually exchangeable between said first optical system and said second optical system based upon the state of said pixels as said signals pass through said pixellated gratings.

12. The optical add/drop multiplexing system as defined in claim 11, wherein at least one of said gratings is a volume holographic grating.

13. The optical add/drop multiplexing system as defined in claim 12, wherein said at least one of said volume holographic gratings is a Polymer Dispersed Liquid Crystal (PDLC) grating.

14. The optical add/drop multiplexing system as defined in claim 11 further comprising a pixelated, switchable grating optically interposed between said second grating, said third grating, said fourth grating and said fifth grating.

15. The optical add/drop multiplexing system as defined in claim 14 further comprising:

a third optical system, said third optical system including a seventh grating, an eighth grating and a ninth grating, a first beam/port and a second beam/port, all of said first series of optical components optically aligned with one another, and said second grating being a pixellated, switchable grating.

16. An optical multiplexing/demultiplexing system comprising:
a first grating;

a second grating;
a first beam/port; and,
a plurality of second beam/ports;
all of said first series of optical components optically
aligned with one another;
wherein a plurality of wavelength division multiplexed
signals which pass through said first beam/port and
through said first and second grating; and,
wherein each one of the plurality of wavelength division
multiplexed signals will pass through one of said
plurality of second beam/ports.

17. The optical multiplexing/demultiplexing system as defined
in claim 16, wherein at least one of said gratings is a volume
holographic grating.